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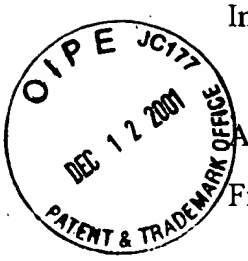

In re application of: Dong-Gyu KIM

Appl. No.: 09/164,392

Filed: September 30, 1998

For: **Liquid Crystal Display And A Method For Driving The Same**

Art Unit: 2774

Examiner: Laneau, R

Atty. Docket: 33404/DBP/Y3
06192.0081.00US00

Appeal Brief

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Sir:

Assignee of the above-referenced application hereby submits an original and two copies of this Appeal Brief to the Board of Patent Appeals and Interferences in support of Appellant's Notice of Appeal filed and received at the U.S. Patent and Trademark Office April 16, 2001.

This Appeal Brief is being resubmitted in response to the Notification of Non-Compliance with 37 CFR 1.192. Although the mailing date was not printed on the Notification, Appellant's agent received the Notification on December 7, 2001. Therefore, it is believed that no extensions of time are required. In the event that extensions of time under 37 C.F.R. § 1.136 are required to prevent abandonment of this patent application, then such extensions of time are hereby petitioned.

The U.S. Patent and Trademark Office is hereby authorized to charge any fee deficiency, or credit any overpayment to our Deposit Account No. 08-3038, referencing docket number **06192.0081.00US00**.

I. REAL PARTY IN INTEREST

As Assignee of the above-referenced patent application, Samsung Electronics Co., Ltd., a corporation of Republic of Korea, is the real party in interest.

II. RELATED APPEALS AND INTERFERENCES

There are no other pending appeals or interferences of applications related to the above-referenced application.

III. STATUS OF THE CLAIMS

Claims 1-16 are pending in the present application. All of these claims were rejected in the final Office Action dated January 16, 2000.

IV. STATUS OF AMENDMENTS

No amendments have been filed subsequent to the final rejection in this case.

V. SUMMARY OF THE INVENTION

The present invention is set forth in the claims; certain specific embodiments are described in the specification. Generally speaking, and without prejudice to the scope of the claims, the present invention relates to a liquid crystal display (LCD) that eliminates or reduces brightness differences between the adjacent pixels induced by the coupling capacitance of a pixel

electrode and its adjacent data line. Also, methods for driving such an LCD are disclosed and claimed. In addition, the present invention avoids pixel defect problems when one or two pixels are short-circuited.

Claims on appeal are set forth in Appendix.

A. Background of LCD Operation

An LCD displays images by controlling the alignment of the liquid crystal in a pixel interposed between two transparent substrates. The alignment of the liquid crystal layer is controlled by applying selectively controlled electric field to each pixel. Each pixel has a pixel electrode and its corresponding part of common electrode to form electric field. In an active matrix type LCD, every pixel has a switching element, such as a thin film transistor (TFT), in order to individually control the electric field applied to each pixel. In the TFT, the gate electrode is connected to the scanning line and the source electrode is connected to the data line. The drain electrode is connected to the pixel electrode. The common electrode is supplied with certain voltage and located either on the opposing substrate to or on the same substrate as the TFT substrate.

When the scanning signal turns on the TFT, the data signal is transmitted to the pixel electrode through the drain electrode. Then, the voltage difference between the pixel electrode charged with data signal and the common electrode forms electric field and rearranges the liquid crystal layer. (*See* pages 1-2 of specification)

However, if the liquid crystal receives the same polarity of electric field and is arranged in the same direction continuously, the electrical and physical characteristics of the liquid crystal may deteriorate. In order to prevent such deterioration, voltages applied to the pixel electrode regularly change the polarities relative to the common electrode voltages. One of such method is a dot inversion method and described in detail on page 2-3 of the specification and Figs. 1a and 1b of the present application.

B. Problems in the Prior Art

The conventional dot inversion method appears to work fine in theory. The polarities of the voltages applied to each pixel are inverted every frame. The number of the pixels receiving the positive polarity voltages is the same as the number of the pixels receiving the negative polarity voltages. Accordingly, the coupling capacitance between the data lines and the common electrodes and the coupling capacitance between the pixel electrodes and the common electrodes should not cause any voltage fluctuations theoretically.

In reality, however, the widths of and the distances between the electrodes and the data lines vary depending on the fabrication process. There may also be misalignment between the electrodes and the data lines. These deviations and misalignment make the respective coupling capacitance between the pixel electrodes and the adjacent data lines different, depending on the position. In the conventional dot inversion method, this coupling capacitance difference between the adjacent data lines and a pixel electrode may generate recognizable brightness difference. (*See* pages 3-6 of the specification and Fig. 2-4)

Furthermore, the conventional dot inversion method renders pixels defective when the two adjacent electrodes are short-circuited. (*See* page 6 and Figs. 5a-5b)

C. Invention of the present Application

In order to solve such problems, in a particular embodiment of the present Application, a common voltage is applied to the common electrode to drive an LCD. And, per each frame, data voltages of different polarities are applied alternately to a group of plurality of pixels that are adjacently located. Especially, the polarities of the data voltage applied to the pixels in the group are the same.

In another embodiment, the liquid crystal display includes a substrate, gate lines, data lines and pixels. Pixels are defined by the intersection of the data lines and the gate lines. The data voltages are applied in different polarities alternately to a pixel group. The pixel group has two or more pixels.

VI. ISSUES ON APPEAL

Only one issue is presented on appeal:

A. Whether Claims 1-16 are patentable under 35 U.S.C. § 103(a) over U.S. Patent 5,724,057 issued to Kimura, *et al.* ("Kimura").

VII. GROUPING OF THE CLAIMS

A. Claims 1-16 stand or fall together on the rejections based on 35 U.S.C. § 103(a): Kimura.

VIII. ARGUMENT

Examiner's Rationale

The Examiner's rationale of rejecting claims 1-16 under 35 U.S.C. §103(a) was stated as follows in the final rejection:

> Kimura discloses a method for driving a liquid crystal display. It has common electrode driving section and a pixel electrode comprising applying common voltage to common electrodes (20, 22), applying data voltage and common voltage of a positive polarity and a negative polarity to liquid crystal 18 as claimed (see column 9, lines 45-67). Further, Kimura discloses a polarity of the data applied to the liquid crystal, even when the designated contrast is relatively high and the amplitude of the data is relatively small, and even when the designated contrast is relatively low and the amplitude of the data is relatively large. Kimura does not disclose a polarity of the data voltage applied to the pixels in the group but it would have been obvious to one of ordinary skill in the art to utilize the polarity of the data taught by Kimura as claimed because it would have prevent the generation of flicker when the contrast of the displayed image is changed (see col. 4, lines 33-35).
>
> Kimura does not teach inversion in units of groups comprising of two or more pixels and having a connecting member formed between the gate lines or connecting the common lines but it would have been obvious to one of ordinary skilled in the art to utilize the pixels in groups because it would prevent pixel defects by utilizing them in group than singularly.

A. Kimura Does Not Teach the Problem or Its Source That is the Object of the Present Application: Therefore, Claims 1-16 Are Patentable Under 35 U.S.C. § 103(a) over Kimura (U.S. Patent No. 5,724,057) as the Examiner has Failed to Establish a Prima Facie Case of Obviousness.

Claims 1-16 are patentable under 35 U.S.C. § 103(a) over Kimura. Kimura does not identify or even suggest the problem and/or its source and solution that are the object of the present Application.

It is well established that the inventor's discovery of the source of the problem may render an invention nonobvious, even though the solution to the problem appears to be simple in hindsight.

The leading Supreme Court decision emphasizing the relevance of the inventor's discovery of the source of the problem is *Eibel Process Co. v. Minnesota & Ontario Paper Co.* 261 U.S. 45 (1923). In the ruling, the Supreme Court observed that "we must not lose sight of the fact that one essential part of Eibel's discovery was that the trouble causing the defective paper product... and that they were due to the unequal speeds of stock and wire at that point and could be removed by equaling the speeds. The invention was not the mere use of a high or substantial pitch to remedy a known source of trouble. It was the discovery of the source not before known and the application of the remedy for which Eibel was entitled to be rewarded in his patent. ... the fact that no one had applied a remedy for the consequent trouble until Eibel, and the final fact that when he made known his discovery, all adopted his remedy, leave no doubt

in our minds that what he saw and did was not obvious and did involve discovery and invention."[1]

Other courts have applied this doctrine. In *In re Sponnable* 405 F.2d 578, 160 USPQ 237 (CCPA 1969), the problem challenged in the art was how to seal the compartments of a "two compartment mixing vials" effectively against moisture transmission.

The applicant discovered that some moisture actually passed through the rubber plug used in the prior art. The applicant cured the problem by simply coating the rubber plug with a thin film of silicon. The Patent Office rejected the claim on the basis of a reference that taught the use of rubber for imperviousness to steam and another reference that taught the use of silicon coating on stoppers.

Reversing the rejection, the Court of Customs and Patent Appeals ruled that "a patentable invention may lie in the discovery of a source of a problem, event though the remedy may be obvious once the source of the problem is identified. ... This is *part* of the 'subject matter as a whole' which should always be considered in determining the obviousness of an invention under 35 U.S.C. §103 .... The fact that moisture transmission was a recognized problem does not establish that knowledge of moisture transmission *through*, rather than around, the plug, was likewise either recognized or obvious. The question here is weather the prior art recognized the *cause* of the problem. There is no teaching in the prior art which would suggest the necessity of

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1 *Eibel Process Co. v. Minnesota & Ontario Paper Co.*, 261 U.S. 45 (1923), at 67-68

selecting a center seal plug material which is more impervious to liquid water than ... natural rubber."[2]

The present Application is directed to solving the problem of brightness difference between the adjacent pixels, when using the conventional dot inversion method. The present Application found that the source of the problem is the difference of the coupling capacitance between the pixel electrodes and the adjacent data lines. Thus, in a preferred embodiment of the present invention, a method and a device is claimed to solve the problem caused by the difference of the coupling capacitance between the pixel electrodes and the adjacent data lines.

However, the cited alleged prior art, Kimura does not at all recognize such problems that are solved by the present Application. Without recognizing the problems, it would not have been obvious for one of ordinary skill in the art to modify the cited reference to render the claimed invention in the present Application that solves the totally different problem.

In general, the Kimura device deals with the flicker problems in LCD *when adjusting the display contrast*. Especially, Kimura asserts a problem of voltage drop ΔV when the gate signal is turned off. Kimura addresses the problem caused by this voltage drop ΔV in a conventional dot inversion method, when adjusting the contrast. (*See* col. 9, ll. 2-31 and Figs. 7A-7B of Kimura) In order to solve this problem, Kimura uses a tone voltage generation and correction circuit comprising a couple of amplifiers and resistors. Kimura resolves such voltage drop problems by adjusting the correction voltage V_0. (*See* col. 7, line 38 to col. 8, line 10 of Kimura)

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2 *In re Sponnoble*, 405 F.2d 578, at 585-86, 160 USPQ 237, at 243-44. See also, *In re Kerkhoven*, 626 F.2d 846, 205 USPQ 1069 (CCPA 1980); *In re Peehs*, 612 F.2d 1287, 204 USPQ 835 (CCPA 1980); *Garrett Corp. v. United States*, 422 F.2d 874, 884, 164 USPQ 521 (Ct. Cl), *cert. denied*, 400 U.S. 951 (1970); *In re Aufhauser*, 399 F.2d

Kimura describes the problem that is totally different from the present Application. Kimura describes the flicker problem caused by voltage drop when the TFT is turned off. Kimura provides a solution by adding a separate circuit that generates a correction voltage.

On the other hand, the present Application describes a problem caused by the coupling capacitance difference between the pixel electrodes and the data lines. The present Application provides a solution by applying alternating polarities of voltages to a group of adjacent pixels.

Kimura asserts totally different problems and suggests solutions that are patently different from the solution claimed in the present Application. No one of ordinary skill with teachings of Kimura would consider it obvious to make an invention claimed in the present Application. From the reference of Kimura, one of ordinary skill in the art would not recognize the problems of coupling capacitance differences between the pixel electrodes and the data lines.

It is an inadequate logical jump to conclude that the invention claimed in the present Application would have been obvious to one of ordinary skill in the art, after merely citing a reference that neither suggests nor recognizes even the cause of the problem. Moreover, where an applicant contends that the discovery of the source of a problem would have been unobvious to one of ordinary skill in the pertinent art at the time the claimed invention was made, it is incumbent upon the PTO to explain its reason if it disagrees. A mere conclusionary statement that the source of a problem would have been discovered is inadequate.[3]

275, 277, 158 USPQ 351 (CCPA 1968); *In re Conover*, 304 F.2d 680, 683, 134 USPQ 238 (CCPA 1962).
3 *In re Peehs*, 612 F.2d 1287, at 1289, 204 USPQ 835, at 837

The question here is whether the prior art Kimura recognized the cause of the problem. The answer is no. There is no teaching in Kimura which would suggest the necessity of applying data voltage to a group of plurality of pixels rather than a single pixel.

Without such teaching, the Examiner cannot simply conclude that the invention claimed in the present Application is obvious.

Likewise, Kimura does not point the problems of recognizing defective pixels when adjacent pixels are short-circuited in the conventional dot inversion method.

Although not clear, the Examiner might have drawn his conclusion of obviousness from the relatively simple method for resolving the problem. The present invention solves the problem by applying alternately the data voltage of the same polarity to a group of a plurality of pixels.

In this case, the prior art, Kimura, has never even hinted to apply data voltage to a group of a plurality of pixels.

In *Intel Corp. v. U.S. Int'l Trade Comm'n*, 946 F.2d 821, 20 USPQ2d 1161 (Fed. Cir. 1991), the Federal Circuit ruled that it was not obvious to extend an EPROM chip's side walls to shield it from ultraviolet radiation, although it may seem only a minor advance. Likewise, the invention claimed in the present Application, applying data voltage to a group of a plurality of pixels cannot be simply rendered obvious by the Examiner's mere conclusionary statement.

In conclusion, by citing a reference that never discloses or suggests the possibility of applying data voltages to a group of a plurality of pixels and simply concluding that the claimed

invention of the present Application, the Examiner made a clear error. By doing so, the Examiner failed to establish a prima facie case of obviousness.

Thus, the Examiner's rejection of these claims should be reversed.

B. Kimura Teaches Away from Applying Signals in a Group of Pixels: Therefore, Claims 1-16 Are Patentable Under 35 U.S.C. § 103(a) over Kimura (U.S. Patent No. 5,724,057) as the Examiner has Failed to Establish a Prima Facie Case of Obviousness.

Kimura is directed to a method and a device for reducing flickers when adjusting contrast. Kimura device achieves this purpose by introducing a tone voltage generation and correction circuit. Contrast of the display is best adjusted when the minimal unit of the display element, i.e. an individual pixel, can be respectively controlled.

However, the Examiner's modification suggests controlling the contrast by a group of a plurality of pixels rather than by an individual pixel. This modification does not serve the objects of the invention claimed by Kimura. Applying pixel voltages of different polarities to a group of pixels would merely complicate the structure of the tone voltage generation and correction circuit and contradicts to the main purpose of invention disclosed in Kimura, a simple contrast adjustment and correction circuit.

One of ordinary skill in the art would not do this without a strong desirability and incentive. Unfortunately, Kimura shows no such incentive or desirability to apply data voltages of different polarities to a group of pixels.

Furthermore, applying voltages to a group of pixels are counterintuitive. In an active matrix LCD, every pixel can be easily accessed or selected via matrix of gate lines and data lines.

One of ordinary skill in the art would not apply data voltages to a group of already individually accessible pixels, without strong desirability or incentives to do so. Kimura does not show such desirability or incentives. On the contrary, Kimura strongly suggests applying data voltages to each individual pixel in order to achieve fine adjustment of the display control.

Kimura teaches away from applying alternating polarities of data voltages to a group of adjacent pixels. Teaching away from the art is a *per se* demonstration of lack of prima facie obviousness.[4] Therefore, the Examiner failed to establish a prima facie case of obviousness. Thus, the Examiner's rejection of these claims should be reversed.

C. Conclusion

For the foregoing reasons, it is submitted that the Examiner's rejection of claims 1-16 under 35 U.S.C. § 103 should be reversed and the claims are respectfully requested to be passed to issuance.

Respectfully submitted,

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4 See e.g. *In re Dow Chemical Co.*, 837 F.2d 469, 5 USPQ2d 1529 (Fed. Cir. 1988); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Nielson*, 816 F.2d 1567, 2 USPQ2d 1525 (Fed. Cir. 1987)

IX. APPENDIX: PENDING CLAIMS

1. A method for driving a liquid crystal display having a matrix of a plurality of pixels with a common electrode and a pixel electrode, comprising steps of:

applying a common voltage to the common electrode; and

applying a data voltage of a positive polarity and a negative polarity with respect to the common voltage alternately to groups of a plurality of pixels that are adjacently located,

wherein the polarity of the data voltage applied to each of the pixels in each group is the same.

2. The method according to claim 1, wherein the pixel group is comprised of three pixels.

3. The method according to claim 2, wherein the pixel group is comprised of a red pixel, a green pixel, and a blue pixel.

4. The method according to claim 1, wherein data voltages having the same polarity with respect to the common voltage are applied to the adjacent pixels in the same column.

5. The method according to claim 1, wherein data voltages having different polarities with respect to the common voltage are applied to the adjacent pixels on the same column.

6. A liquid crystal display, comprising:

a substrate;

a plurality of gate lines formed on the substrate;

a plurality of data lines insulated from and intersecting the gate lines and transmitting a data voltage; and

a plurality of pixels formed corresponding to respective regions defined by the data lines

and the gate lines,

wherein a common voltage is applied to the plurality of pixels, and wherein polarities of the data voltage with respect to the common voltage are inverted in a unit of a pixel group, and wherein the pixel group is comprised of two or more pixels.

7. The LCD according to claim 6, wherein the pixel group is comprised of three pixels.

8. The LCD according to claim 7, wherein the pixel group is comprised of a red pixel, a green pixel, and a blue pixel.

9. The LCD according to claim 6, wherein a distance d2 between a first data line adjacent to the pixel group and a pixel adjacent to the first data line is two to six times longer than a distance d1 between a second data line in the pixel group and the pixel adjacent to the second data lines.

10. The LCD according to claim 9, wherein the distance d2 is four times longer than the distance d1.

11. The LCD according to claim 6, wherein the gate lines are arranged in groups of two, a first gate line and a second gate line, and a connecting member is formed between the first gate line and the second gate line.

12. The LCD according to claim 11, wherein the connecting member is interposed between pixels of different pixel groups.

13. The LCD according to claim 6, wherein the common voltage is applied through a common electrode formed on the substrate.

14. The LCD according to claim 13, wherein common lines, applying the common

voltage, are connected to the common electrode, the common lines comprising a first common line and a second common line, and a connecting member connects the first common line and a second common line.

15. The LCD according to claim 14, wherein the connecting member is interposed between pixels of different pixel groups.

16. The method according to claim 1, wherein the pixel group is comprised of a column of red pixels, a column of green pixels and a column of blue pixels.